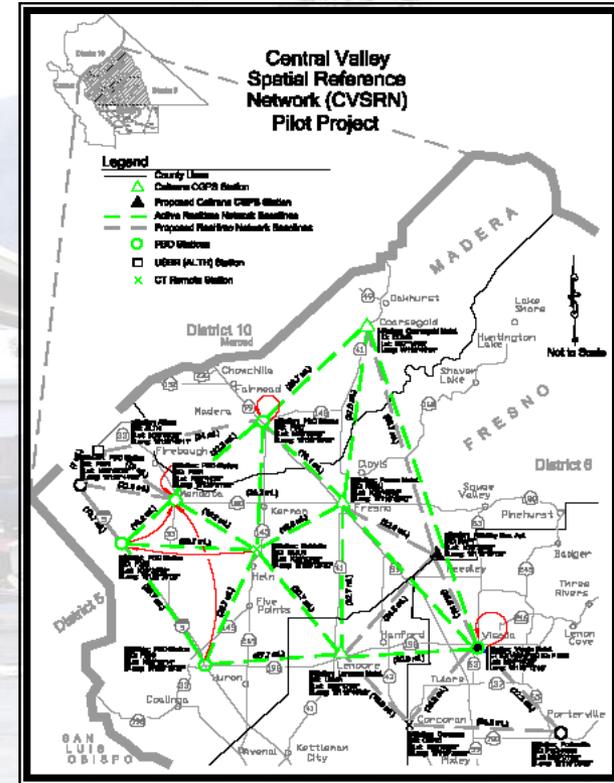


CVSRN-Central Valley Spatial Reference Network

- 📍 Pilot Project
- 📍 Build-out
- 📍 Monument Styles
- 📍 Communication/Telemetry
- 📍 Project Update

Presenter: Darrell Bain, Caltrans

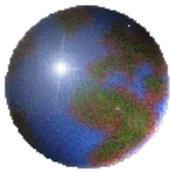


JAN 10 2007

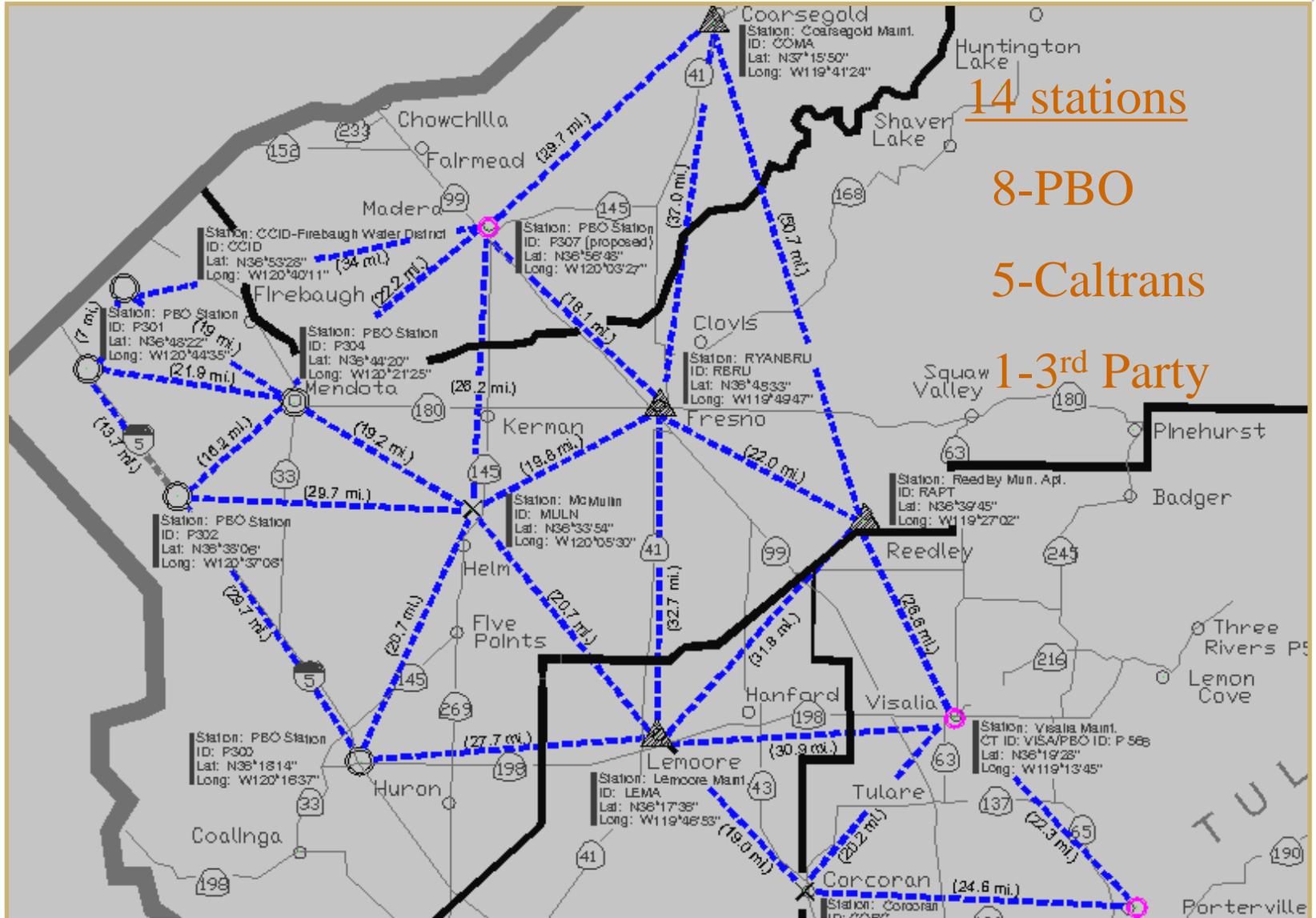


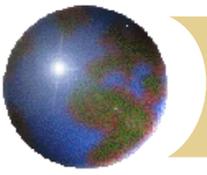
June 14, 2007

Darrell Bain, PLS



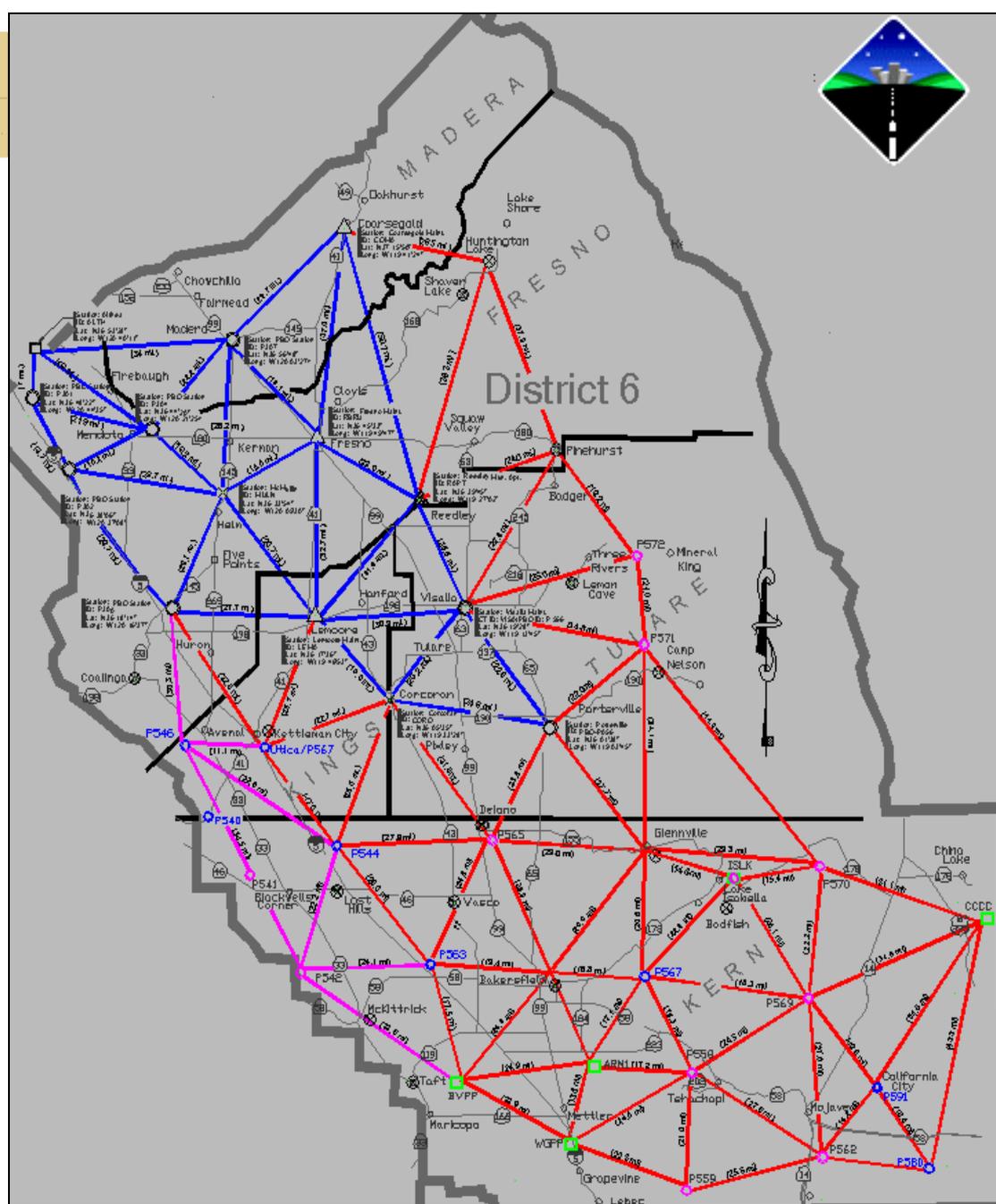
CVSRN- Central Valley Spatial Reference Network Pilot Project

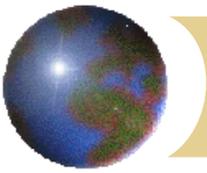




Build-Out

- 39 total stations
- Includes 5 counties





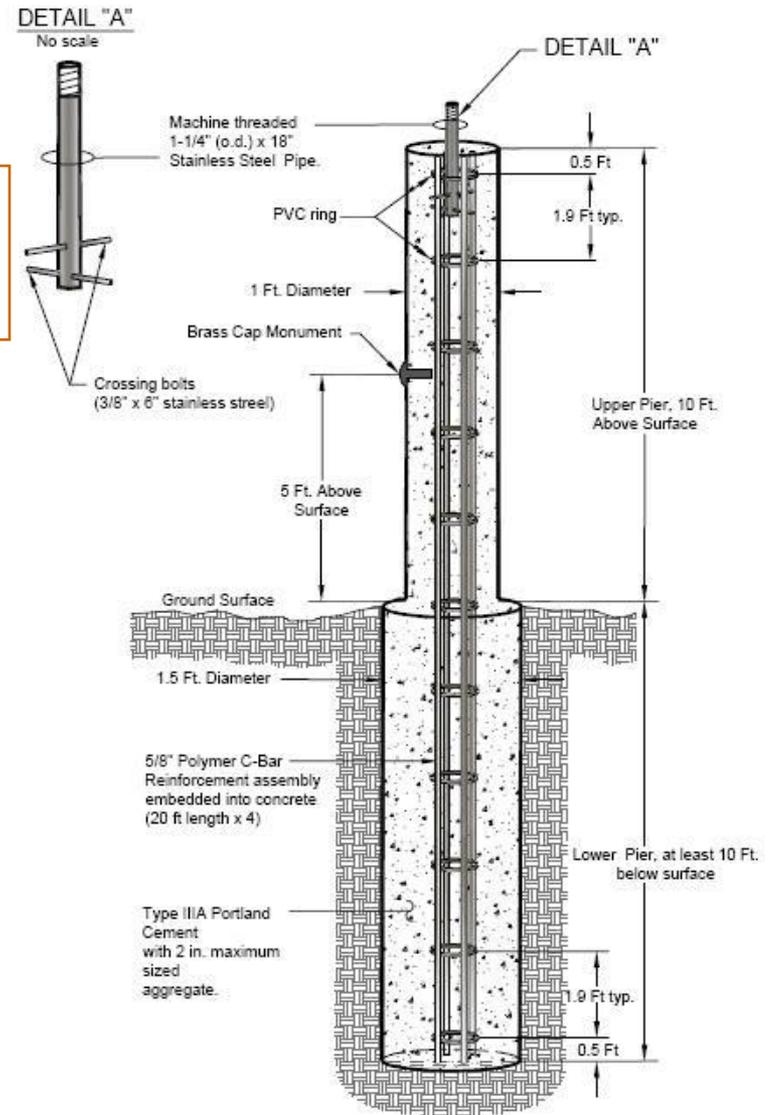
Monument styles

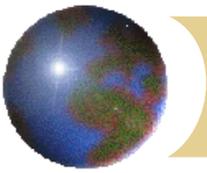
Caltrans Monument design is a “modified” NGS Specification.

Extended the pillar 10 feet above ground to minimize multi-path and open up sky view.

20 foot fiberglass “rebar” rather than 8 feet.

The height gave us added security!

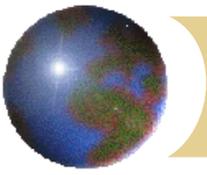




Example:



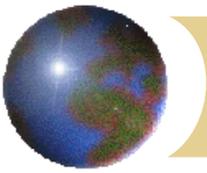
Caltrans-District 06-Surveys



Monument Style

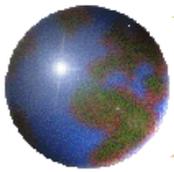
 PBO





Communication

- ✚ Hard-wired into Caltrans Backbone Network
- ✚ Radio telemetry into POE (point of entry)

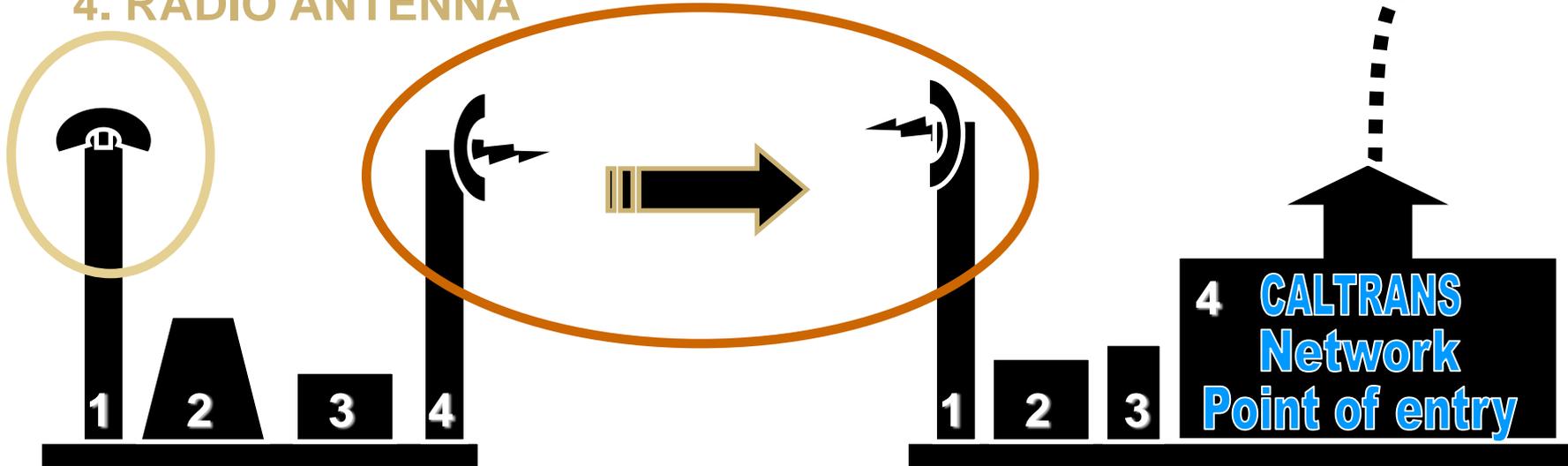


Telemetry

CENTRAL SERVER

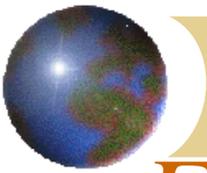
- 1. GPS ANTENNA
- 2. RECEIVER
- +
- 3. RADIO
- 4. RADIO ANTENNA

- 1. RADIO ANTENNA
- 2. RADIO
- 3. CONVERTER
- 4. CALTRANS NETWORK

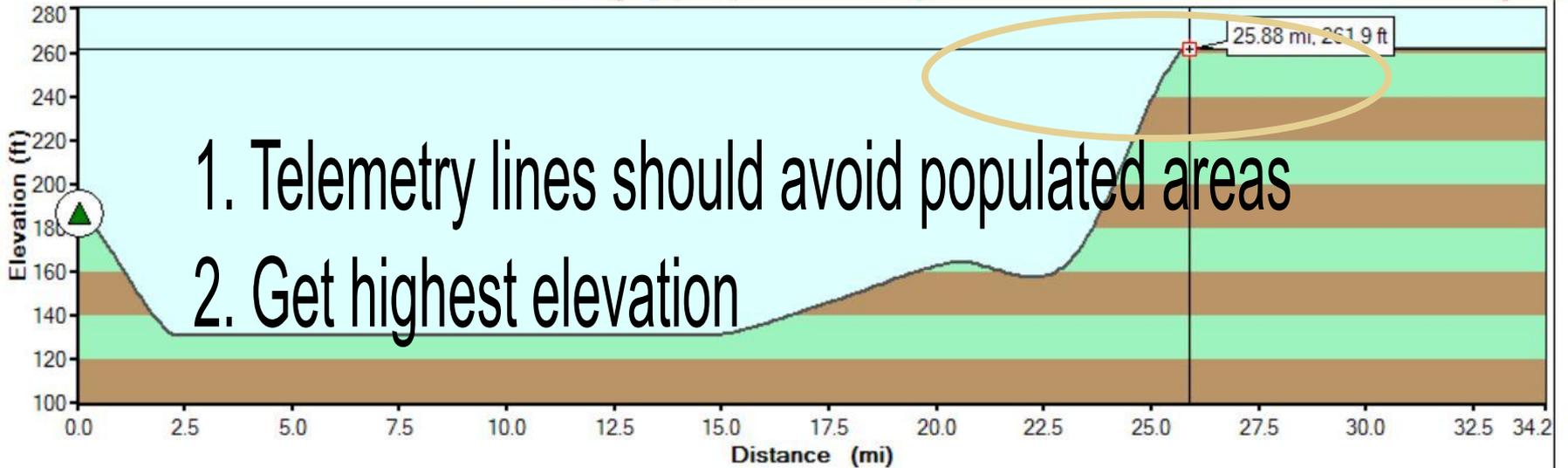
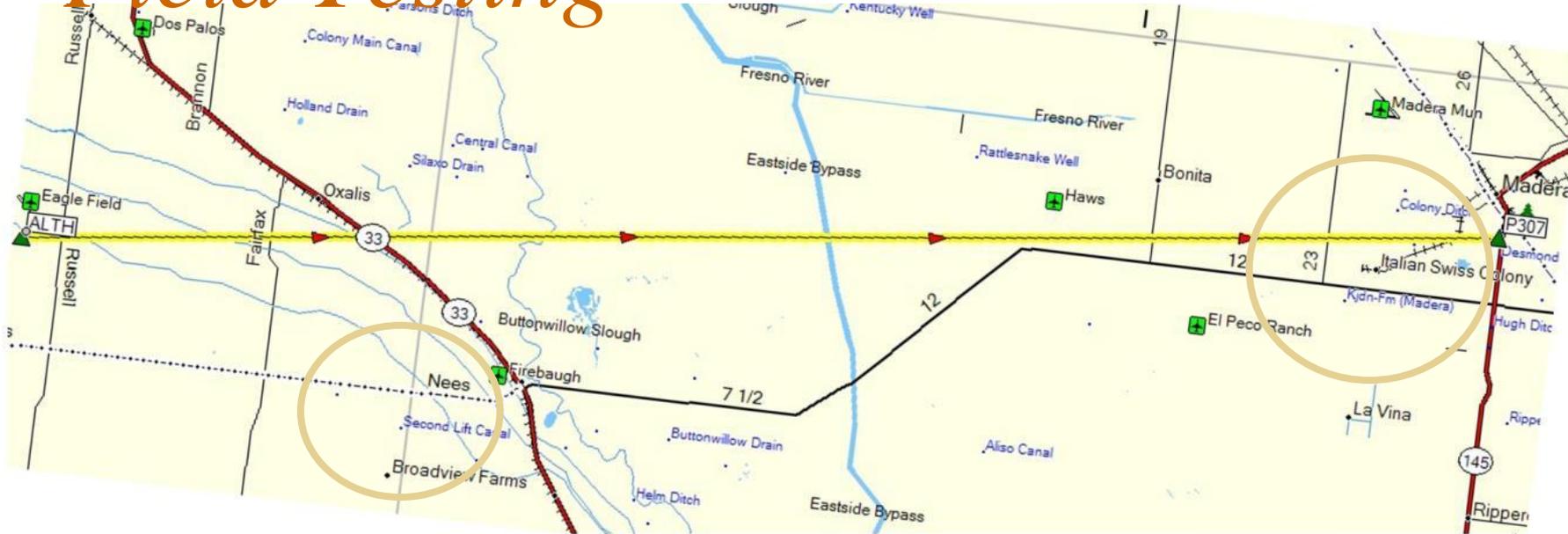


CT & PBO
REMOTE
STATIONS

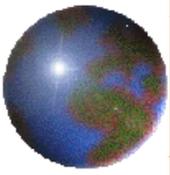
CALTRANS
MAINTENANCE YARD



Field Testing



1. Telemetry lines should avoid populated areas
2. Get highest elevation



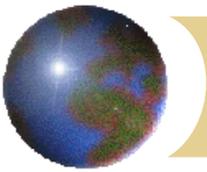
Field Testing



with **WiLAN** Radio and Parabolic Antenna

30 miles





Report Capture

Current Time: 00:24:18.720
Start Time: 00:00:00.000
Temperature: 33C 91F

Radio	Name	Address	Type	Route	Known since
self 2	Leaf	00-00-f0-1d	Leaf		
parent 3	Root	00-00-f0-1c	>ROOT<	3	00:23:46

DIRECT LINKS:

Node #	Name	Ch	Speed Mbps	Pwr dBm	RSSI dBm	Km Miles	Data Pkts	Dropped Pkts	%
from parent	broadcast	5	1	-69			7	0	0.0
to 3	Root	5	1	23	-71	3.2	4		
from 3	Root	5	1	23	-68	2.3	0	0	0.0

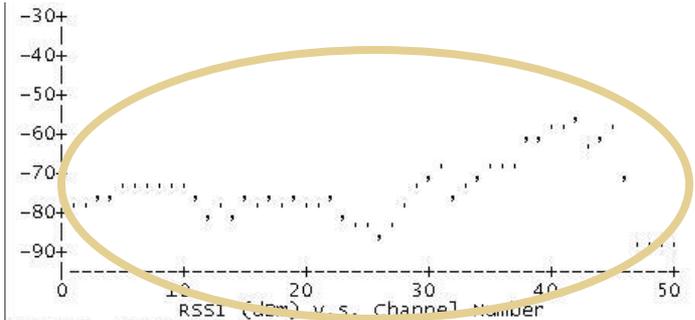
Leaf #> sh
Current Time: 00:24:22.540
Start Time: 00:00:00.000
Temperature: 33C 91F

Radio	Name	Address	Type	Route	Known since
self 2	Leaf	00-00-f0-1d	Leaf		
parent 3	Root	00-00-f0-1c	>ROOT<	3	00:23:46

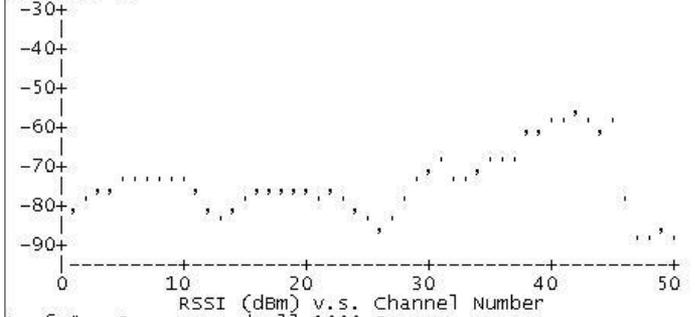
DIRECT LINKS:

Node #	Name	Ch	Speed Mbps	Pwr dBm	RSSI dBm	Km Miles	Data Pkts	Dropped Pkts	%
from parent	broadcast	5	1	-69			7	0	0.0
to 3	Root	5	1	23	-70	3.2	4		
from 3	Root	5	1	23	-68	2.3	0	0	0.0

Leaf #> sh
Current Time: 00:24:26.900
Start Time: 00:00:00.000
Temperature: 33C 91F



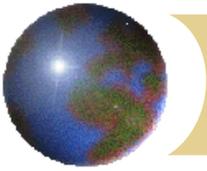
Leaf #> !specan a dwell=1000 0
antenna: A



Leaf #> !specan a dwell=1000 0
antenna: A

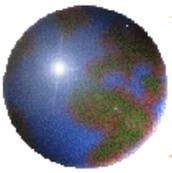


1. Signal strength
2. Radio traffic - noise



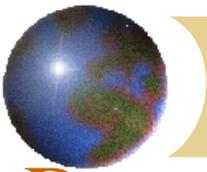
Caltrans site example:





PBO site example:



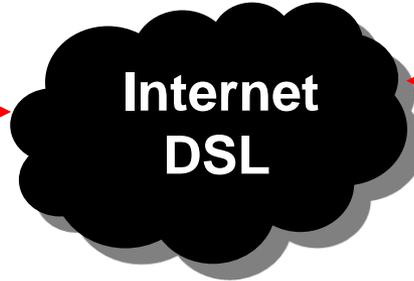


Data connectivity to CT backbone

Reference Station



Connectivity Example 1



Caltrans Network
Backbone

Connectivity Example 2

Reference Station



Caltrans Network
Point of Entry



Connectivity Example 3

Reference Station





CVSRN Update

Progress

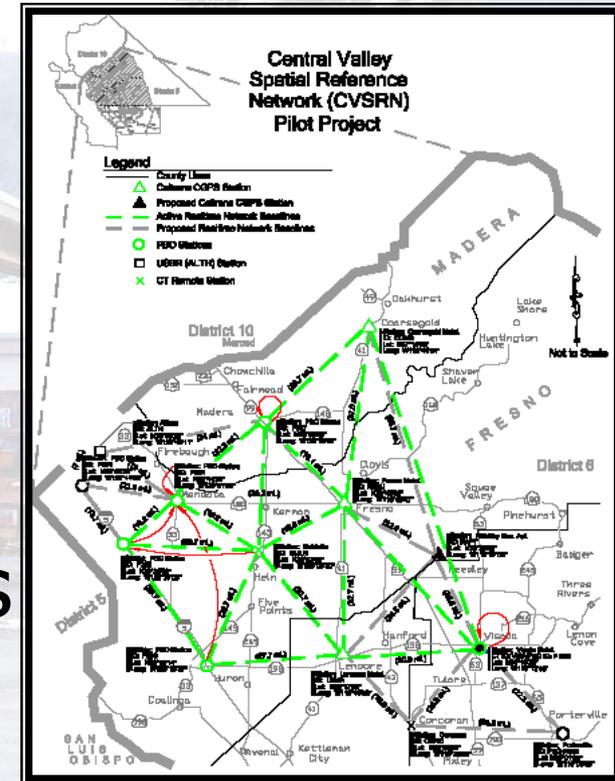
Market Analysis

Software

Partnering Developments

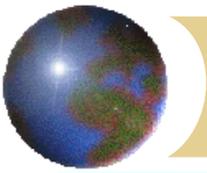
Pilot Project

What's next?



JAN 10 2007



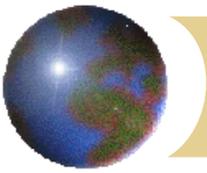


Re-cap

Central Valley Spatial Reference Network (CVSRN)

The California Department of Transportation's Central Region ~~is moving~~ **has** moved forward with the planning and building of a scalable regional spatial network that ~~will have~~ **has** Real Time Kinematic Network (RTKN) capabilities. The CVSRN ~~will be~~ **is** comprised of Global Positioning System (GPS) stations that are permanently in place and operate continuously. The data from this network ~~will be~~ **is** used for post processing as well as instantaneous real time processing .

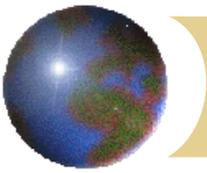




CVSRN 2 years ago

- ❖ Permitted 4 PBO sites within Pilot project area.
- ❖ Processing Permits for 3 additional PBO Sites (2 of which are part of the Pilot Project).
- ❖ 5 Locations had been sited at existing Caltrans Maintenance Stations.
- ❖ 1 Site had been located at the Reedley Municipal Airport – Permit in progress
- ❖ 1 remote station was sited along Route 145.



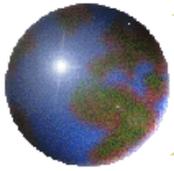


Progress- 2 years later

- ⊕ Permitted 9 PBO sites, 6 being within Pilot Project
- ⊕ Partnering with USBR, added an additional station
- ⊕ Built 5 Caltrans Permanent GPS stations on CT facilities or within R/W
- ⊕ Completed agreement and construction of a CT station with the City of Reedley. Reedley Airport site.
- ⊕ Completed agreement with the City of Porterville and PBO, incorporating Porterville airport site into network



JAN 3 2007

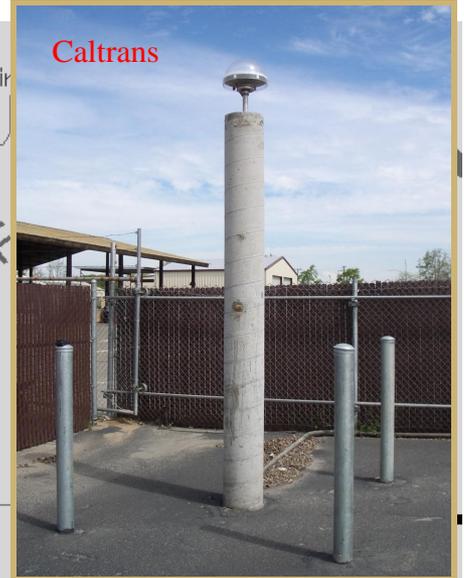
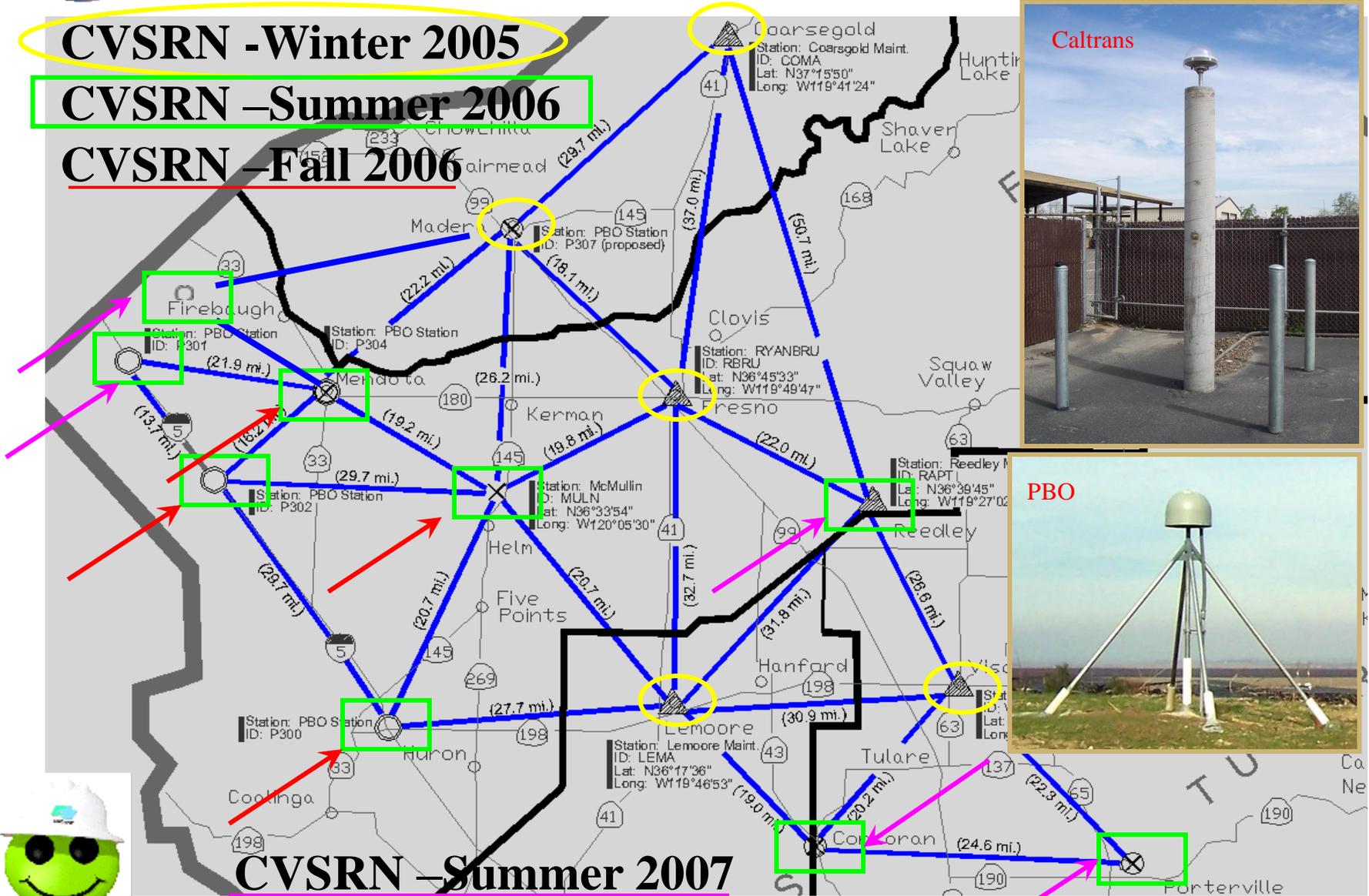


CVSRN - Winter 2005

CVSRN - Summer 2006

CVSRN - Fall 2006

CVSRN - Summer 2007





Coarsgold
 Station: Coarsgold Maint.
 COMA
 N37°15'50"
 W119°41'24"

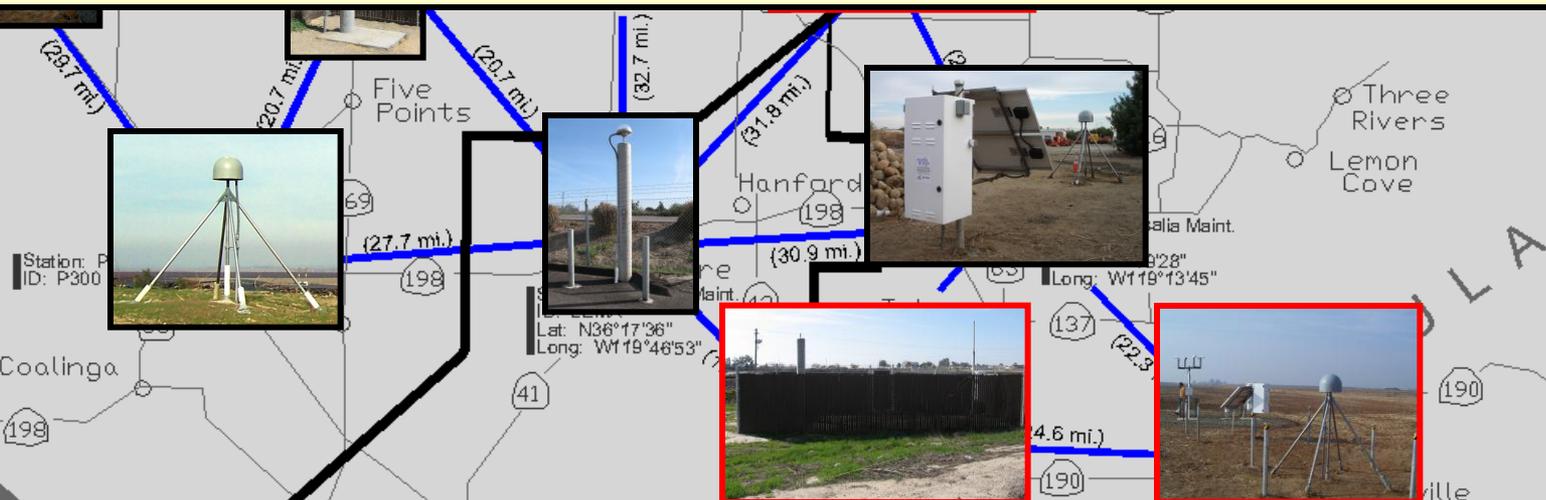
Huntington Lake
 Shaver Lake

FRESNO

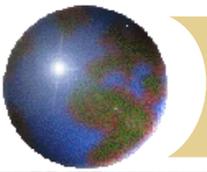
District 6



Network encompasses 7500 Sq. Mi. and
 1053 Highway miles



LANAR
 Co
 Ne



Progress cont'd

Software – Market Analysis

- ✚ July 2006-RFI
- ✚ 5 Vendor Responses
 - ▣ Trimble
 - ▣ Leica
 - ▣ Geodetics Inc.
 - ~~▣ Topcon~~
 - ~~▣ Eagle Point~~



Request For Information

**CGPS / RTK Network Software
For The State of California Department of
Transportation - Central Region
Fresno, CA**



Introduction

The State of California Department of Transportation, CalTrans, is issuing this Request for Information (RFI) in an effort to gain detailed information on installation, operation, training, IT requirements, maintenance and cost of a network of survey grade Continuous Global Positioning System (CGPS) Reference Stations and a Real Time Reference Network (RTRN).

THIS IS NOT A SOLICITATION FOR SUCH PRODUCTS AND/OR SERVICES AND NO AWARD WILL RESULT.

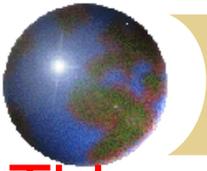
Information that any interested party submits will be done on a voluntary basis and with the understanding that this RFI is for information gathering purposes. A formal RFP may, or may not, be issued as a result of this RFI.

Any cost information submitted will be used solely for the purposes of establishing target budgets for the acquisition of the necessary products and services. Cost information will not be considered as responsive to any future solicitations and is not binding on either party. The State reserves the right to contact responders for additional information at its sole discretion, and to issue additional RFIs.

Inquiries regarding this information gathering process, the submission of general or specific information, including the need for any information from CalTrans staff, and any and all other questions shall be submitted in writing to (email is preferred):

Darrell Eskin, PLS
Senior Transportation Surveyor-Central Region
885 1st Street, Suite 200
Fresno, CA 93721
E-mail: Darrell_Eskin@dot.ca.gov
Office: 559.445.6555
Fax: 559.445.6560

9/18/2006.....1 of 32



This was done at no cost to the State

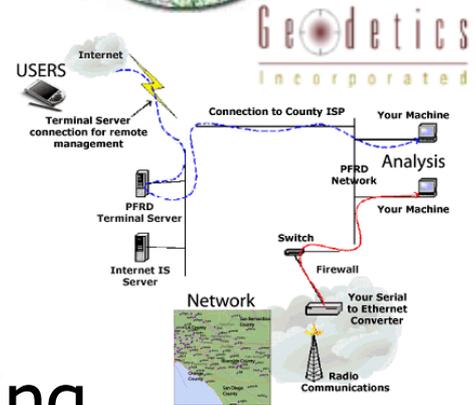
Market Analysis



Trimble
Worldwide

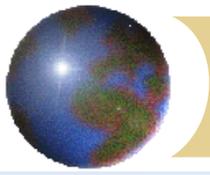


- ✚ Written Response to RFI
- ✚ Vendor Installation
- ✚ 30 day evaluation period
 - ▣ IT DMZ security
 - ▣ Network operation and monitoring
 - ▣ Field Surveys
 - ▣ GIS applications
 - ▣ Vendor support and training



Geodetics
Incorporated





Software Procurement

- ⊕ Approved FSR
- ⊕ Secured COS software funding
- ⊕ Market Analysis enabled determination of software specifications to meet our needs
- ⊕ SOW-Scope of Work
- ⊕ ITPP-Information Technology Procurement plan
- ⊕ CMAS procurement process
- ⊕ Working closely with DPAC and HQ OLS



California Department of Transportation
Division of Right of Way

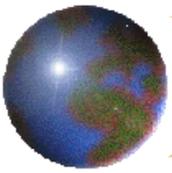
Central Valley Plan

Feasibility Study
December, 20

ITPP Content (Template)

Agency Name: Department of Transportation
Project Name: Central Valley Special Reference Network (CVSRN)
SOW Project No:
State of person/responsible for developing the ITPP: Darrell Bink
Title: Senior Transportation Surveyor
Office: Central Region Office of Lead Surveys
Address: 855 N. Loma, Suite 100, Fresno
Address: 201 Code for Project: 6907
Phone Number: 558-444-8858
E-mail Address: darrellbink@dot.ca.gov

Chief Information Officer (CIO) Name: Ann M. Davison
CIO Signature (Official Use of CIO)
Chief Information Officer (CIO) Signature
Phone Number: 558-454-3200

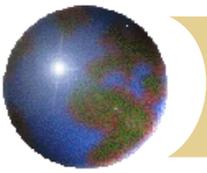


Potential partnering developments

- ✦ PG&E
- ✦ CA. State Dept. of Water Resources
- ✦ Districts 11,7,8

(All dependent on developing a satisfactory business models for data sharing.)





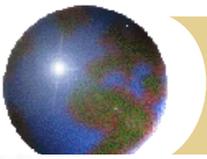
What's left to complete the Pilot Project

⊕ Telemetry/Radio Solutions

⊞ ALTHEA, P300 + Repeater	\$8000
⊞ RAPT, CORO+Blue Ridge Repeater P056	\$25,000
⊞ 1 GPS Receiver & Antenna	<u>\$25,000</u>
Total	\$58,000

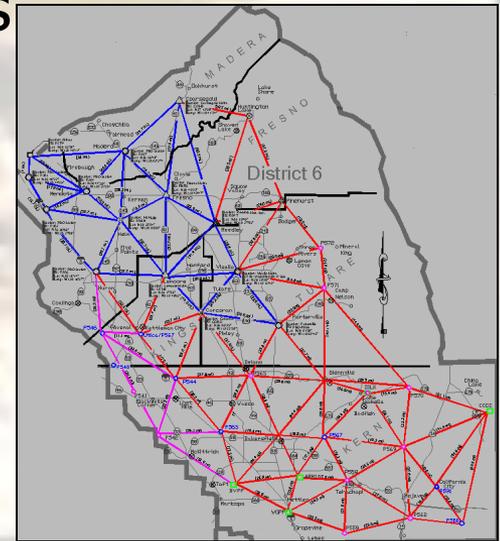
⊕ Software Procurement/Installation **Funded**

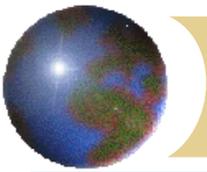




Goals

- ⊕ Complete Pilot Project Telemetry
- ⊕ Implement Pilot Project June 30, 2007
- ⊕ Begin Tracking Pilot Project results
- ⊕ Foster partnerships for build-out opportunities and load sharing
 - ⊞ PG&E → DWR → Local Cities & Counties
 - ⊞ Explore Project funded station installation → Machine Guidance
- ⊕ Develop Business Models
- ⊕ 1 year pilot project analysis report





- Central Valley Spatial Reference Network (CVSRN)
- *2 years ago the concept was born...*
 - *Today- 9 stations streaming...*
 - *2 months from now....a fully functional 14 station Pilot Network...*
 - *The first Caltrans Real-time GPS network in the State!*



Questions?



SEP 1 2006

